Development of a Walking Safety Scale for Older Adults, Part I: Content Validity of the GEM Scale

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ABSTRACT

Purpose: The Grille d'évaluation de la sécurité à la marche (GEM scale) is a performance-based tool developed to fill the need for an objective assessment of walking safety for older adults. It underwent a three-phase process of content validation.

Method: A mailed questionnaire was used to assess the representativeness of the walking items (5-point pertinence scale). Subsequently, two physiotherapist focus groups ($n = 20$) were held to further evaluate the relevance of the scale and the walking items. Finally, a pilot study was completed with 3 raters administering the GEM scale to 12 hospitalized patients.

Results: Comments and descriptive statistics (percentages) were analyzed from the questionnaire results and focus groups. On completion of the pilot study, which assessed 12 patients on the GEM scale, additional analyses were performed to address the theoretical background, the administration manual, the walking items, the scoring scale, and interpretation of the scale. Following each step, modifications were made to reflect the results of the analyses.

Conclusion: The three-phase content-validation process demonstrated the relevance of this instrument and its representativeness as a walking safety assessment tool for older adults.

Key Words: assessment, clinical practice, gait, geriatrics, physiotherapy

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RÉSUMÉ

Objet : La Grille d'évaluation de la sécurité à la marche (GEM) est un instrument fondé sur la performance qui a été conçu afin de combler le besoin d'une évaluation objective de la sécurité à la marche chez les aînés. Il a fait l'objet d'un processus de validité de contenu en trois phases.

Méthodologie : Un questionnaire postal a été envoyé pour évaluer la représentativité des items de la marche (échelle de cotation à cinq niveaux). Par la suite, en utilisant la technique de discussion de groupe focalisée, deux groupes ($n = 20$ physiothérapeutes) se sont tenus pour évaluer plus en profondeur la pertinence de l'instrument et les items de la marche. Finalement, trois évaluateurs ont réalisé une étude pilote en utilisant la GEM auprès de 12 patients hospitalisés.

Résultats : Des commentaires et des statistiques descriptives (pourcentages) ont été analysés à partir des résultats au questionnaire et des groupes de discussion. À la fin de l'étude pilote auprès des 12 patients évalués avec la GEM, d'autres analyses sur les fondements théoriques, le guide de passation, les items de la marche, l'échelle de cotation et l'interprétation de la GEM ont été effectuées. À la fin de chaque étape, des modifications ont été apportées basées sur les résultats aux analyses.

Conclusion : Le processus de validité de contenu en trois phases a démontré la pertinence de la GEM et sa représentativité à titre d'instrument d'évaluation de la sécurité à la marche chez les aînés.

Mots clés : évaluation, pratique clinique, marche, gériatrie, physiothérapie

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BACKGROUND

Many older adults have difficulty walking, and some require human assistance or a walking aid.[1–3] For the majority of older patients, the ability to walk independently is a major goal in their activities of daily living. Normal aging, as well as the effects of diseases more prevalent in older adults, often lead to impairments that can affect walking ability.[4–7] Physiotherapists are confronted daily with the task of evaluating safety in walking, whether or not a patient uses a walking aid. Evaluation of safety in walking is multidimensional and culminates in a decision that determines whether the patient can walk alone, with or without a walking aid, or with supervision or assistance because of safety considerations.

Assessments by physiotherapists should include tests at the impairment level while also considering the influence of perceptual, cognitive, or psychological concerns.[8,9] Information on the patient's medical condition, his or her living context, and his or her own perception of the ability to walk safely is also needed. Usually a visual assessment of gait, with or without a walking aid, is performed by the clinician because of its ease, rapidity, simplicity, and low cost.[10,11] However, no standardized clinical assessment of gait safety has been identified.

Assessment of functional gait must include evaluation of unimpeded gait as well as of the ability to modify and adapt gait to expected and unexpected disturbances to locomotion.[12] Gait adaptations in response to environmental changes (including stepping safely on altered surfaces and walking over and around obstacles) are necessary for safe mobility.[13] Some clinical tests developed to evaluate mobility or the risk of falling include the activity of walking.[6,9,14–19] Other comprehensive assessments that require direct observation of numerous activities or tasks, including walking, measure physical disability or level of function.[20–28] Tests that provide detailed examination of walking have been developed[2,12,18,23,29–32] including those by Nelson,[33] Olney et al.,[31] Mikulic et al.,[18] Means,[5] and Gill et al.;[16] these tests incorporate elements of functional walking in which performance is measured by the time required to complete tasks. However, the quality and safety of ambulation are also important factors to assess when considering gait safety for geriatric patients. Obstacle courses such as those described by Means[5] and Wolf[32] more closely resemble the type of evaluations routinely conducted by physiotherapists, but they are limited in their application in evaluating walking safety because performance is timed or because the set-up of the obstacle course is impractical for a clinical setting. None of the foregoing tests specifically assesses walking safety, with or without a walking aid, and therefore they do not assist in decision making with respect to gait safety.

Fear of falling should also be considered when assessing walking safety. Patients' fear of falling may reflect their own difficulties with balance and gait and can contribute to functional decline in gait and mobility.[34–37] Bandura defined perceived self-efficacy as ''people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives.''[38 p. 71] The Falls Efficacy Scale and the Activities-Specific Balance Confidence (ABC) Scale were designed to identify an elderly person's mobility confidence with respect to situation-specific items, including walking and stair climbing.[39,40] Although King and Tinetti wrote that the individual's confidence in the ability to perform daily activities without falling is closely related to his or her actual performance, no tool has been identified that combines an objective assessment of safety during walking tasks with an assessment of perceived safety in walking.[37]

To increase safety, a walking aid (such as a cane or walker) may be recommended to compensate, either permanently or temporarily, for impairments that affect walking or to alleviate pain, weakness, impaired balance, and so on.[41–46] Although typically a walking aid is introduced to facilitate ambulation, dissatisfaction and/or injury to the user can occur.[43–51] This may be due to the inappropriate choice or adjustment of a device, improper use, or the mechanical condition of the aid itself.[43–51] Accidents associated with the use of walking aids may also occur.[43–53] Wright and Kemp demonstrated the attentional demands required when using a walking aid and noted that these demands may remain high even after extensive use of these devices.[54] Holden et al. also mentioned that using a walking aid requires extra coordination and motor planning.[23] Therefore, if a walking aid has been recommended or is used, it is essential that it be included in evaluating the patient's safety in walking.

The need for a standardized, comprehensive assessment tool to evaluate walking safety, with or without a walking aid, that is applicable in the clinical setting was identified.[55] Our objective was that the proposed instrument be a performance-based test accessible to all physiotherapy professionals without the need for formal training. Other criteria were that the test be easy to administer, that it involve equipment normally found in most physiotherapy departments, and that it provide a score. With these criteria in mind, the first two authors initially consulted physiotherapists of Centre Rouville, a rehabilitation centre that had been using an in-house walking scale for several years. This scale, although it had not undergone psychometric testing, included walking items similar to those used by therapists at the Institut universitaire de gériatrie de Montréal (IUGM). Subsequently, the two principal authors developed a more specific and refined instrument, the Grille d'évaluation de la sécurité à la marche (GEM), or walking safety

assessment scale. Below we present details of the GEM scale and the three-phase content-validation process. The interrater and test–retest agreement have also been assessed (see Dubé et al., ''Part II: Interrater and Test-retest Agreement of the GEM Scale,'' elsewhere in this issue).

DESCRIPTION OF THE GEM SCALE

Designed for use with older patients, the GEM scale is intended for administration by physiotherapists or physical rehabilitation therapists. The latter are licensed therapists who have completed a three-year post-secondary diploma and work in the field of physiotherapy in the province of Quebec; they treat patients in accordance with the Order in Council of the government of Quebec. The GEM scale can be used in a physiotherapy department or in other clinical settings. The 29-page manual includes application guidelines, objectives, specific information regarding the materials required, instructions for raters, score sheets, and information on how to interpret results.[56]

The GEM scale addresses two concepts: walking and safety. We retained the definition of walking as bipedal locomotion incorporating alternating movement of the lower extremities and maintenance of dynamic balance, as defined in French by Plas et al.[57] Our definition of safety was provided by Rogers and Holm: ''safety refers to the extent to which patients are at risk when engaged in tasks [. . .] safety is applied to the way in which patients interact with objects and their environment to perform tasks.''[58 p. 194] The GEM scale is divided into three sub-scales (A, B, C), in each of which the patient may use a walking aid if required. The patient performs the walking items at his or her own pace, and unlimited rest periods are permitted. Applying the GEM scale (depending on the number of items administered and the number of rest periods taken by the patient) may take as little as 15 minutes but typically requires 25 minutes.

The objective of sub-scales A and B is to determine whether the patient can walk safely indoors on his or her own. Sub-scale A assesses safety in basic indoor walking skills, whereas sub-scale B includes advanced walking items (see Table 1). The walking items in sub-scales A and B cover a distance varying from 1 m (e.g., A6: walking backwards) to 10 m (e.g., A1: walking forward). To determine a person's safety in walking indoors, the rater must apply sub-scales A and B. Whereas the patient must attempt all walking items in sub-scale A, some items in sub-scale B may be irrelevant based on the patient's living setting. For example, if the therapist needs to evaluate walking safety on a hospital ward, where there are no doorsills, carpeting, or stairs, then items B3 and B6–B13 are not performed. The GEM scale includes questions to ask the patient, before and after completing the walking items, concerning his or her perception of his or her walking safety in different environments (walking in his or her room, walking to the bathroom, walking to the dining room).

Table 1 Walking Items for each Sub-scale

Sub-scale	*Items*
Sub-scale A: Basic Level	A1: Stand up from a chair (or wheelchair) and walk 10 m
	A2: Walk 1 m, then turn 180° and walk 1 m
	A3: Walk 2 m and turn the head to the right
	A4: Walk 2 m and turn the head to the left
	A5: Walk 2 m and stop abruptly
	A6: Walk backwards 1 m
	A7: Walk sideways 1 m to the right
	A8: Walk sideways 1 m to the left
	A9: Walk 1 m, make an 'S' around 2 chairs, and walk 1 m
	A10: Walk 1 m and sit down on the chair (or wheelchair)
Sub-scale B: Advanced Level	B1: Walk 1 m and then sit on a chair without armrests
	B2: Get up from a chair without armrests and walk 1 m
	B3: Walk 1 m, go over a doorsill, and then walk 1 m
	B4: Walk 1 m, pick up a shoe, and walk 1 m
	B5: Walk 1 m and open then close a door
	B6: On carpet, walk 5 m
	B7: On carpet, walk 1m then turn 180° and walk 1 m
	B8: On carpet, walk backwards 1 m
	B9: On carpet, walk 1 m sideways to the right
	B10: On carpet, walk 1 m sideways to the left
	B11: On carpet, walk 1 m, make an 'S' around 2 chairs, and walk 1 m
	B12: Walk 1 m, climb stairs, and walk 1 m
	B13: Walk 1 m, descend stairs, and walk 1 m
Sub-scale C: Pretest for Outdoor Walking	C1: Walk 1 m and step up onto a platform 15 cm high
	C2: Step down from a platform 15 cm high and walk 1 m
	C3: On mat, walk 2 m
	C4: On mat, walk 1m then turn 180° and walk 1 m
	C5: On mat, walk 1 m and stop abruptly
	C6: On mat, walk backwards 1 m
	C7: Walk 3 m up an incline
	C8: Walk 3 m down an incline
	C9: Walk 1 m, climb stairs, and walk 1 m
	C10: Walk 1 m, descend stairs, and walk 1 m

Sub-scale C is used as a screening tool for outdoor walking. Included are walking items that take place indoors but resemble those involved in walking outside, such as walking on an incline (approximately 5°) and on an uneven surface (mat approximately 5 cm thick). Walking distances vary from 1 to 3 m (see Table 1). The patient's own perception of his or her walking safety outdoors is also rated before beginning and after completing the sub-scale. If all walking items in sub-scale C are completed safely, then the therapist proceeds with a formal evaluation of outdoor walking, where additional elements may affect walking safety.

Scoring System

The GEM comprises three scoring scales: (1) perception scale, (2) safety scale, and (3) rater scale. The first two scales provide scores that are used in the therapist's determination of his or her final decision (i.e., the rater score) using the rater scale. The first scale is a three-level perception scale that refers to the patient's perception of

Table 2 Safety Scale and Scoring System

Score or Code	*Description*	*Value in Global Score*
Score		
2	Safe	2
1S	Requires supervision/cueing	1
1A	Requires assistance	1
0	Danger	0
Code		
7	Refusal	0
8	Non-applicable	Not calculated

his or her walking safety in different environments. The patient chooses from among the following responses: (a) feels unable to walk alone safely, (b) feels somewhat or sometimes able to walk alone safely, or (c) feels able to walk alone safely.

Second, a four-level safety scale is used to rate safety during performance of the walking items. For each walking item, the rater assesses whether the patient is walking safely (score 2), requires the presence of the therapist for supervision/cueing (score 1S) or for assistance (score 1A), or performs the item dangerously, even with the assistance of the therapist (score 0). If a patient refuses to perform an item, then the therapist enters a code of 7; a code of 8 is given to each non-applicable item. A global score for each sub-scale is obtained by adding the values of the scores given for each walking item (see Table 2).

Third, the rater score for sub-scales A and B represents the therapist's decision with respect to indoor walking (i.e., basic-level indoor walking for sub-scale A and advanced indoor walking for sub-scale B). As identified in the literature review, this decision must take into consideration both the patient's performance during the walking items as well as the patient's perception of his or her own walking safety. For sub-scale A, the rater score is based on a three-level scale and is obtained by analyzing the global score (numerical score) for sub-scale A and the patient's perception (ordinal score); the same procedure is then carried out for sub-scale B. For the rater score for sub-scales A and B (indoor walking), the therapist chooses one of three ratings: (a) the patient is not safe in walking, (b) the patient is somewhat or sometimes safe in walking, and (c) the patient is safe in walking. In sub-scale C, a pretest for outdoor walking, there is a two-level scale for the rater score based solely on the global score for sub-scale C. The therapist assigns the patient a rating of either (a) or (c): (a) the patient does not have the prerequisites for safe outdoor walking or (c) the patient has the prerequisites for safe outdoor walking.

Interpretation

For sub-scales A and B, interpretation of the GEM scale is based on the therapist's analysis of the patient's perception and on the global score for each sub-scale. On completion of sub-scale A (considering the global score, the patient's perception, and any remarks noted during the assessment), the therapist analyzes the results and attributes a rater score for basic-level indoor walking.

To be safe for basic indoor walking (rater score of (c)), the patient must perform all 10 of the walking items on sub-scale A safely (score of 2 for each item) and must perceive him- or herself as safe in walking. If the patient is assessed as unsafe (safety score of 0, 1A, or 1S) in any one of the walking items in sub-scale A, the rater score is (a) (not safe in walking), as these items represent basic-level walking. A rater score of (b) would be given if a patient, for example, performed the walking items safely and considered himself safe to walk in the morning yet perceived himself as unsafe when walking in the afternoon.

Sub-scale B, which must be completed to provide essential information as to how the patient performs in advanced walking items, leads to the rater score for advanced indoor walking. If the patient does not perform all relevant advanced walking items safely in sub-scale B, the therapist sets restrictions (rater score (b)) on walking in relation to the items that were scored as unsafe (e.g., if the patient is not able to walk and open/close doors safely, the therapist would advise the patient that doors should be left open). Similarly, a rater score of (b) is given if, for example, a patient completes the items of sub-scales A and B safely and perceives herself to be safe when walking in her room and to the bathroom but does not feel safe to go to the dining room; the therapist would recommend that the patient walk alone only in her room and to go to the bathroom.

Sub-scale C assesses the minimal abilities needed for safe outdoor walking. In this sub-scale, the rater score is based only on the global score of the walking items. To fulfil the prerequisites for safe outdoor walking, the patient needs to accomplish all the items safely (score of 2 for each item). Because sub-scale C is a screening tool, it does not replace the actual evaluation done outdoors by the clinician, which must still be performed to fully assess the patient's ability to walk outdoors.

METHODS

The GEM scale underwent a three-phase process of content validation: a survey of Canadian physiotherapists and rehabilitation therapists working with geriatric clients or in geriatric settings, two focus groups of physiotherapists from the Montreal region, and a pilot study in which the scale was administered to 12 older-adult patients in hospital. The objective of the first two phases was to assess the representativeness of the scales and the individual walking items for walking safety. The objective of the third phase was to evaluate

whether the instrument was operational within the target population.

Survey

The first phase of content validation involved surveying therapists throughout Canada using a questionnaire. An initial version of the GEM scale (sub-scales A, B, C) was sent to 159 centres in Quebec that provide different levels of patient care. This same version was then translated into English by two bilingual physiotherapists from IUGM. Using a list obtained from the Canadian Physiotherapy Association that included predominantly general hospitals, the English version was sent to 51 institutions in the other nine provinces. A cover letter explained that the objective of the questionnaire was to consult physiotherapists as part of the validation process for the GEM scale and indicated a deadline for responses. Physiotherapists and physical rehabilitation therapists were asked to complete a detailed questionnaire that included specific questions related to work experience and use of different clinical tests for walking. This was followed by an evaluation by the therapists of the overall pertinence of each sub-scale, taken as a whole, using a five-point scale (0 = non-pertinent, 1 = slightly pertinent, 2 = moderately pertinent, 3 = pertinent, 4 = very pertinent). Using the same scale, each walking item was subsequently rated for its relevance in the evaluation of walking safety. For each sub-scale, the respondents were asked to make comments or to propose other walking items that they felt should be included in an assessment of walking safety. The percentage of pertinence was calculated for each sub-scale and each item by calculating the response frequency for each level on the pertinence scale.

Focus Groups

The second content-validation phase involved consultation with physiotherapists ($N = 20$) recruited from the Montreal region and divided into two focus groups.[59] These physiotherapists had clinical experience with older patients and represented different clinical settings (e.g., acute-care hospitals, home-care programmes, rehabilitation centres). The GEM scale (as revised following the questionnaire results), including its objectives, the sub-scales, and the scoring system, was described and discussed. A research assistant recorded the comments made during the discussions by each group. The physiotherapists completed an evaluation sheet assessing the overall pertinence of each sub-scale, followed by the pertinence of each walking item, using the same five-point pertinence scale as in the mailed questionnaire. Percentages of pertinence ratings for sub-scales A, B, and C, as well as for each walking item, were calculated.

Pilot Study to Administer the GEM Scale

As the third and final step in assessing content validity, the GEM scale was administered to 12 hospitalized older-adult patients (mean age 77.8 ± 6.4 years) from the IUGM. This pilot study used a multiple-case methodology[60] and was approved by the Ethics Committee of the IUGM. Treating therapists working in either rehabilitation or geriatric assessment units of this centre identified patients who met the inclusion criteria. All participants were Francophones, 65 years old or more, and in need of an evaluation of walking safety. Patients for whom weight bearing on one or both legs was contraindicated were excluded. Each participant signed an informed consent in accordance with the procedures of the IUGM Ethics Committee. The participants' characteristics are presented in Table 3.

Three raters were involved, one of whom was the first author, a physiotherapist. The other raters, a physiotherapist and a physical rehabilitation therapist, were recruited from other centres. These raters needed to be Francophones with at least three years' experience working with older-adult patients and not to have participated in the survey or focus group studies. They were given the GEM administration manual two weeks prior to initiating data collection. During data collection, all three raters scored the GEM scale simultaneously; however, the first author was the lead evaluator, while the other two raters followed and observed. The lead evaluator gave the instructions and ensured the participant's safety. After each assessment, the three raters held detailed audio-recorded discussions, each lasting approximately 1 hour, addressing predetermined themes (e.g., concepts of walking and safety, walking items, scoring system, instructions to subjects) and any ambiguities they had encountered.

RESULTS

Results of the three phases of content validation are presented in the following sections.

Table 3 Description of Participants in Pilot Study

Characteristics of subjects (N = *12*)	N *(%)*
Gender	
Female	10 (83.3)
Male	2 (17.7)
Walking aid	
Two-wheeled walker	5 (41. 7)
Cane	3 (25.0)
None	2 (16.7)
Quadruped cane	1 (8.3)
Forearm crutches	1 (8.3)
Diagnosis	
Orthopaedic	7 (58.3)
Neurological	3 (25.0)
Others	2 (16.7)

Survey

By the predetermined deadline, 105 questionnaires were returned from 91 institutions, representing a 50% response rate (see Table 4). Of the 23 institutions that responded from outside Quebec, 5 sent more than one completed questionnaire. Among the Quebec respondents, two institutions sent two responses each. Of all questionnaires received, 66.7% originated from Quebec ($n = 70$) and the remaining 33.3% from other Canadian provinces ($n = 35$). Respondents and non-respondents from outside Quebec were similar; all were from general hospitals. When respondents were compared to non-respondents within Quebec, there was a similar distribution among the different types of patient programmes, with the exception of long-term care facilities and rehabilitation centres (see Table 5). Of the rehabilitation centres invited to participate, 65% (9/14) responded to the survey; a large proportion (45.1%) of institutions that did not respond were long-term care programmes, including nursing homes, chronic-care units, and residential centres. When the 105 questionnaires returned were analyzed, we found that the majority of respondents (88.6%) had 5 or more years' clinical experience, and 67.6% had 10 years or more. Their clinical experience spanned different types of patient-care programmes, from acute care to rehabilitation and long-term care.

The data relating specifically to each of the sub-scales and to the walking items were analyzed. A small proportion of therapists (12–16%) did not answer the question about the overall pertinence of each sub-scale. Of the 92 who answered, however, 90.2% rated sub-scale A as very pertinent or pertinent in the evaluation of safe walking; 89.9% provided similar responses for sub-scale B, and 72.7% for sub-scale C (see Table 6). As to assessment of the pertinence of each individual walking item, between 81% and 97% of respondents scored all but two items as very pertinent or pertinent for sub-scale A. Only 63% of respondents scored standing on the right and left leg as pertinent or very pertinent. The individual walking items of sub-scale B were scored by 83.5 to 97% of therapists as very pertinent or pertinent, with similar results for sub-scale C (83.5–99%). These results, as well as written comments from respondents, led to several modifications to the initial version of the sub-scales.

For sub-scale A, two items—standing on the right leg and standing on the left leg—were eliminated. The instructions for two items (walking on carpet in sub-scale B and walking on the mat in sub-scale C) were altered slightly to incorporate the element of safe walking over a somewhat longer distance. Of the 45 respondents who wrote comments suggesting additions to sub-scale B, 73% felt that an assessment of stairs should be incorporated into this sub-scale. Consequently, ascending stairs and descending stairs were added to sub-scale B.

Sub-scale C, the initial objective of which was to evaluate a person's ability to walk safely for a short distance outside, provoked many comments. Most respondents felt that, because of the numerous variables involved in such a process (e.g., observing the person walking on different exterior surfaces), this sub-scale would be insufficient to assess safe walking outside, even for a limited distance. However, they did comment that the walking items were representative, to a certain degree, of walking outdoors and some suggested that additional mat-walking items be included. In response to these comments, we added three walking items on the mat. Furthermore, the objective of sub-scale C was amended to indicate that it is a pretest for outdoor walking and that in order to assess a person's safety in walking outside, an actual evaluation outdoors is necessary.

The two most frequent responses to the question about which clinical tests respondents currently used

Table 4 Details of Questionnaire Respondents

	Institutions		
	Questionnaires Sent (N = *210*)	*Respondents* (n = *91*)	*Questionnaires Received* (n = *105*)
Quebec	159	68	70
British Colombia	7	3	7
Alberta	6	3	3
Saskatchewan	4	3	8
Manitoba	3	2	2
Ontario	25	9	11
New Brunswick	2	2	2
Nova Scotia	1	1	2
Prince Edward Island	1	0	0
Newfoundland	2	0	0

Table 5 Quebec Institutions That Responded (n = 68) and Those That Did Not Respond (n = 91) to the Survey

Type of Service/ Clientele	*Type of Institution*	*Respondents* n *(%)*	*Non-respondents* n *(%)*
Active in-patients	General hospital	26 (38.2)	30 (32.9)
	Rehabilitation centre	9 (13.2)	5 (5.5)
Community services	Home care	5 (7.4)	6 (6.6)
Long-term patients	Residential centre	0 (0)	7 (7.7)
	Nursing home	7 (10.3)	13 (14.3)
	Chronic-care centre	18 (26.5)	21 (23.1)
Other		3 (4.4)	9 (9.9)

Table 6 Scores for Overall Pertinence of Each Sub-scale for Questionnaire Results

Pertinence levels (n = *105*)	*Sub-scale A* n *(%)*	*Sub-scale B* n *(%)*	*Sub-scale C* n *(%)*
Very pertinent	68 (64.8)	55 (52.4)	41 (39.0)
Pertinent	15 (14.3)	26 (24.8)	23 (21.9)
Moderately pertinent	4 (3.8)	6 (5.7)	16 (15.2)
Slightly pertinent	1 (0.9)	0 (0)	7 (6.7)
Non-pertinent	4 (3.8)	2 (1.9)	1 (0.9)
Incomplete	13 (12.4)	16 (15.2)	17 (16.2)

when assessing walking were the Berg Balance Scale (89%) and the timed up and go (TUG) test (63%). Other tests, such as the Functional Independence Measure (FIM) and the Chedoke-McMaster Stroke Assessment, were mentioned less often (23% and 10% respectively). Comments were almost unanimous regarding the need for an instrument that specifically evaluates walking safety and allows the patient to use a walking aid. Many respondents wrote that the items on the three sub-scales represented walking tasks that patients are faced with in everyday situations. The patient's own perception of his or her walking safety was also deemed essential, and the three-level question relating to that perception was considered appropriate.

Focus Groups

The focus groups provided important information on the GEM sub-scales. Most (95–100%) of the focus-group participants—20 clinicians who worked in geriatrics—assessed all three sub-scales as very pertinent or pertinent to the evaluation of walking safety. Sub-scales A and B were rated as very pertinent by 85% of participants, and 15% and 10% scored them as pertinent. Although only 55% considered sub-scale C to be very pertinent, 40% rated it as pertinent. There was general agreement among the therapists regarding the need for a pretest for outdoor walking. Once again, the three-level score given to the patient's perception of his or her walking safety was considered pertinent by focus-group participants, 95% of whom assessed the relevance of the safety scale as pertinent or very pertinent.

Between 75% and 100% of focus-group participants evaluated all but two of the walking items on sub-scales A and B as very pertinent or pertinent. Only two items on sub-scale A—walking sideways to the right (A7) and to the left (A8)—received lower percentages (65%). However, the same walking items performed on carpet (B9 and B10) in sub-scale B were deemed pertinent or very pertinent by 80% of respondents. The discussions that followed led to a consensus that walking sideways be retained in both sub-scales. For six of the eight individual items of sub-scale C, a large number of physiotherapists (70–95%) gave ratings of very pertinent or pertinent. Two items—stopping suddenly while walking on the mat (C5) and walking backwards 1 m on the mat (C6)—received lower ratings (60% and 65% respectively). Consensus was not achieved, and we decided to retain these two items for the next step of content validation. Consensus was achieved concerning the walking distances for each item. The remaining comments recorded during the focus groups reflected a need to clarify the written descriptions of some of the items and the instructions to patients.

The focus-group results and discussions led to further modifications to the GEM scale. Five types of changes were made: (1) more precise information was added as to the type of material used; (2) slight modifications were made to the instructions for several of the walking items, in an effort to increase patient understanding, to better simulate walking situations, or to increase safety during the evaluation; (3) clarifications were made in the general instructions given to patients with respect to rest periods and their use of a walking aid; (4) cueing was added to the second level of the safety-scale score (1S); and (5) items involving ascending/descending stairs that simulate exterior stairs in the patient's living setting were added to sub-scale C.

Pilot Study to Administer the GEM Scale

Following administration of the GEM scale to 12 older-adult hospital patients, the audio-taped recordings of the discussions by the three raters were transcribed verbatim for each patient and then analyzed by the first three authors. Data reduction was performed several times. During preliminary analyses of the data, the information was synthesized and 5 topic areas were identified: (1) administration manual for the raters, (2) order of the walking items in each sub-scale, (3) scoring scales, (4) interpretation of results, and (5) concepts of walking and safety. Using an iterative process, the results were further analyzed, leading to modifications of the GEM scale. More specifically, the concepts and the scoring scales were clarified and minor changes were made to the procedures, the instructions given to patients, and the interpretation of the results for each sub-scale.

DISCUSSION

The literature reviewed demonstrated that no clinical tool exists specifically to evaluate walking safety in older adults. The GEM scale was developed to fill this need and subsequently underwent a content-validation process to assess the representativeness of the sub-scales and of each of the walking items and to pilot-test the instrument with geriatric patients.

Results from the mailed questionnaires and the subsequent focus groups allowed the authors to consult with a large number of physiotherapists and rehabilitation therapists working in various geriatric clinical settings. When the Quebec responses to the survey were analyzed, the greater number of questionnaires returned by rehabilitation centres suggests the need for such a scale on the part of therapists who routinely evaluate walking safety. The lower response rate to the survey from therapists working in long-term care institutions may reflect the fact that therapists in these types of programmes are less frequently confronted by the need to assess walking safety, as a number of their patients spend much of their time in a bed or wheelchair.

Modifications were made to the GEM scale following the first two content-validation phases. The vast majority of therapists welcomed the development of a walking-safety assessment tool and found it useful and pertinent to their geriatric practice setting. For all three sub-scales, agreement was attained among therapists on almost all the individual walking items.

Those who responded to the survey and those who participated in the focus groups gave high ratings for the overall pertinence of sub-scales A and B. The somewhat lower pertinence ratings for sub-scale C among survey respondents were most likely due to the fact that the original objective of this sub-scale was to evaluate whether a patient was able to safely walk a short distance outdoors (e.g., from her home to the curb). Many therapists felt that walking outdoors is more complex and that direct evaluation of a patient's walking performance outside is required in order to make this decision.

Consequently, the objective of sub-scale C was modified prior to the focus-group sessions, and the sub-scale was presented instead as a pretest for outdoor walking. The distribution of pertinence scores for sub-scale C among focus-group participants was somewhat different than for the other sub-scales, although discussions among the participants clearly demonstrated the need for such a pretest. These results may be explained by the fact that some of the focus-group therapists worked in home-care programmes and felt that a pretest was not necessary for their clientele, as it was possible to directly assess their walking outside the home. The home-care therapists remarked also that it would be impossible to organize the equipment necessary for sub-scale C (e.g., platform, mat, incline) in a home setting. However, the pilot study to administer the GEM provided support for retaining sub-scale C as a pretest.

Six walking items were identified as problematic. The items that involved standing on one leg (right and left) were removed following the survey, as the questionnaire results indicated low pertinence ratings and comments revealed that therapists considered these to be more like balance tasks than walking-safety tasks. Although a number of survey respondents commented that walking sideways (sub-scale A) was potentially a difficult item, 79% scored this item as very pertinent or pertinent, and 80% scored the same walking items performed on carpet (sub-scale B) as pertinent or very pertinent. Walking sideways (to the right and left) on the floor and on carpet were retained after the focus-group participants agreed that it would be necessary for assessing walking safety in areas where space is limited. Two items on the mat in sub-scale C (walking backwards and stopping abruptly while walking) did not attain agreement in the focus groups; however, the subsequent pilot study revealed the importance of these items in the context of a pretest for outdoor walking on uneven surfaces.

In the final phase of content validation for the GEM scale, the pilot study tested all three sub-scales on older-adult hospital patients with diverse diagnoses and walking aids. The goal of this phase was to apply the GEM scale to a group of patients representing the target population. The authors analyzed the test administration and results and made final modifications to the GEM scale during the process. This third phase of content validation demonstrated that the tool was operational with geriatric patients and fulfilled its objective of evaluating walking safety. The GEM scale thereby satisfies requirements for content validity, in that it represents the performance domain of walking safety for the geriatric population.[61]

Survey respondents identified a number of other clinical tests used to assess walking. However, the objective of the GEM scale is different from those of the tests mentioned (i.e., to standardize the assessment of walking safety and to specifically orient clinicians in their decision process regarding this activity). The Berg Balance Scale is a measure of functional balance but does not assess performance in walking. Although the TUG test allows the use of a walking aid, it provides general information on physical mobility by timing only one walking task. The FIM's aim is to provide an estimate of the burden of care by assessing 13 motor and 5 cognition items;[62] the instrument uses a 7-point scale to assess the level of independence in a task, including standing up, locomotion, and stair climbing. The FIM provides a general assessment of a patient's disability in several domains, but the only walking task is walking forward on a flat surface. The Chedoke-McMaster Stroke Assessment evaluation is an instrument divided into two parts. One of these, the Activity Inventory, aims to assess the effectiveness of treatments by measuring functional outcome and incorporates 5 walking items.[62] This test not only has a different objective from the GEM scale but is also restricted in the number of walking items and is applicable only to persons who have had a stroke. Because the foregoing tests have different objectives from the GEM scale, do not include the range of walking tasks identified as necessary to assess walking safety, and do not incorporate the element of self-efficacy, none is appropriate when the aim is specifically to allow a therapist to evaluate a patient's safety in walking.

CONCLUSION

The GEM scale is an instrument that can be administered by physiotherapy professionals to assess walking safety indoors (sub-scales A and B) and as a pretest for safe outdoor walking (sub-scale C). Based on results of the mailed survey and the focus groups, therapists see a need for such a tool and appreciate the fact that it allows the patient to use a walking aid. Furthermore, they support the inclusion of an assessment of the patient's own

perception of his or her walking safety and the use of this information in the interpretation and subsequent recommendations made by the clinician. Analyses of the first two content-validation phases allowed the authors to make changes to the instrument. The pilot study not only confirmed the value of these modifications but, through its actual use with geriatric patients, also led to further minor adjustments to the scale. The results of this three-phase content-validation process demonstrate the relevance of this assessment tool and its representativeness as a walking-safety assessment instrument for older adults.

KEY MESSAGES

What Is Already Known on This Subject

Although various mobility and gait assessments currently exist, these do not specifically assist physiotherapy professionals in deciding on an older patient's safety in walking. A patient's perceived self-efficacy should be included in this process. An assessment tool that combines the performance of walking items with input from the patient on his or her perception of his or her walking safety was therefore needed.

What This Study Adds

The GEM scale was thus developed for this purpose. The results of our three-phase content-validation study demonstrated the relevance and representativeness of the GEM scale as a walking-safety assessment. A clinical instrument that uses a standardized approach to evaluate walking safety with older adults is now available and ready for reliability studies.

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